

Biomass Energy and Biofuels from Oregon's Forests

Mike Cloughesy,

OFRI

Joe Misek,

ODF





Woody Biomass

“Material from trees and woody plants, including limbs, tops, needles, leaves and other woody parts, grown in a forest, woodland, farm, rangeland or wildland-urban interface environment that is the **by-product of forest management, ecosystem restoration or hazardous fuel reduction treatment.**” (SB 1072)



Fire Condition Class in Oregon



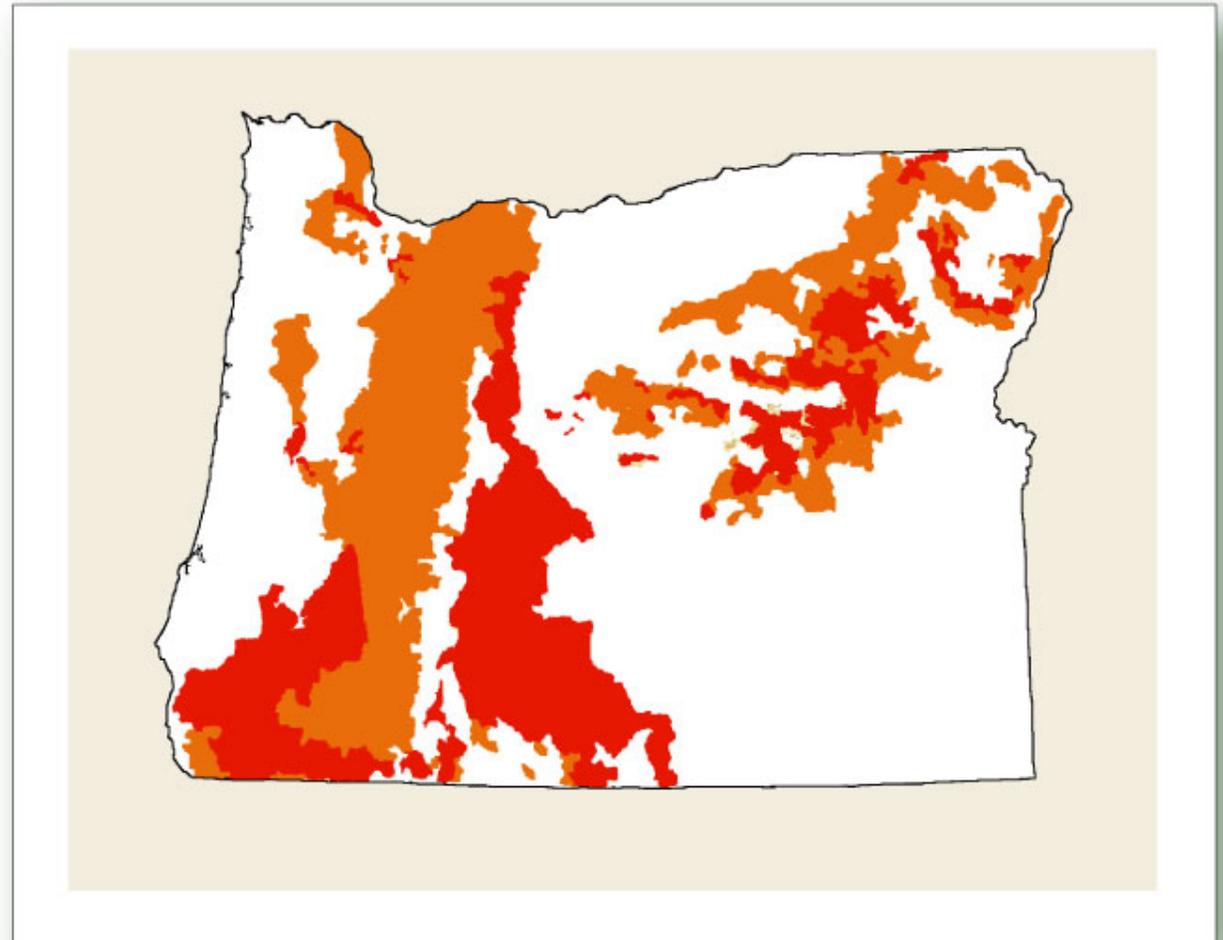
Forestland in Condition Class 3

- At high risk of uncharacteristically intense fire



Forestland in Condition Class 2

- At moderate risk of uncharacteristically intense fire





USFS Strategic Assessment

All Ownerships - Oregon

- ❖ 16.9 million acres of Treatable Timberland*
- ❖ 5.6 million acres of Condition Class 3
- ❖ 6.6 million acres of Condition Class 2
- ❖ 12.2 million acres of Condition Class 2 and 3

*Treatable land is not high elevation or reserved and within 1.5 miles of roads.

USDA Forest Service 2005. *A Strategic Assessment of Forest Biomass and Fuel Reduction Treatments in Western States.*



OFRI Study: Biomass Energy and Biofuels from Oregon Forests

Study Premise:

- ❖ Woody Biomass could be harvested from overstocked, fire-prone forests and be used to make electricity, biofuels and other products
- ❖ Addresses three challenging Oregon needs:
 - restoring forest health, fire resiliency and wildlife habitat,
 - finding renewable energy alternatives, and
 - revitalizing rural economies



OFRI Study: Biomass Energy and Biofuels from Oregon Forests

- ❖ Review existing research
- ❖ Conduct interviews with Oregon biomass stakeholders
- ❖ Assess potential for production of electric energy and biofuels from wood biomass in Oregon
- ❖ Review and summarize efforts underway in Oregon
- ❖ Assess constraints and challenges to woody biomass
- ❖ Develop recommendations on how Oregon can overcome the barriers



Key Study Findings

- ❖ Study analyzed potential biomass supply from fuel reduction treatments across 20 eastern and southern Oregon counties
- ❖ An estimated **4.25 million acres** (about 15% of Oregon's forestland) have the potential to provide forest biomass by thinning of forest stands to reduce risk of uncharacteristic fire
- ❖ Opportunities exist in Klamath/Lake, Jackson/Josephine/Douglas, Grant/Union/Wallowa/Baker & Crook/Deschutes/Jefferson/Wasco Counties
- ❖ Eligible area includes public and private timberland with moderate to high fire risk which is outside of designated roadless areas, wilderness areas, parks and other forestlands where harvesting is excluded. Federal lands make up 71% of potential acres
- ❖ Thinning these acres over 20 years could produce **1.0 million bone dry tons (BDT) per year** of woody biomass not including merchantable sawtimber

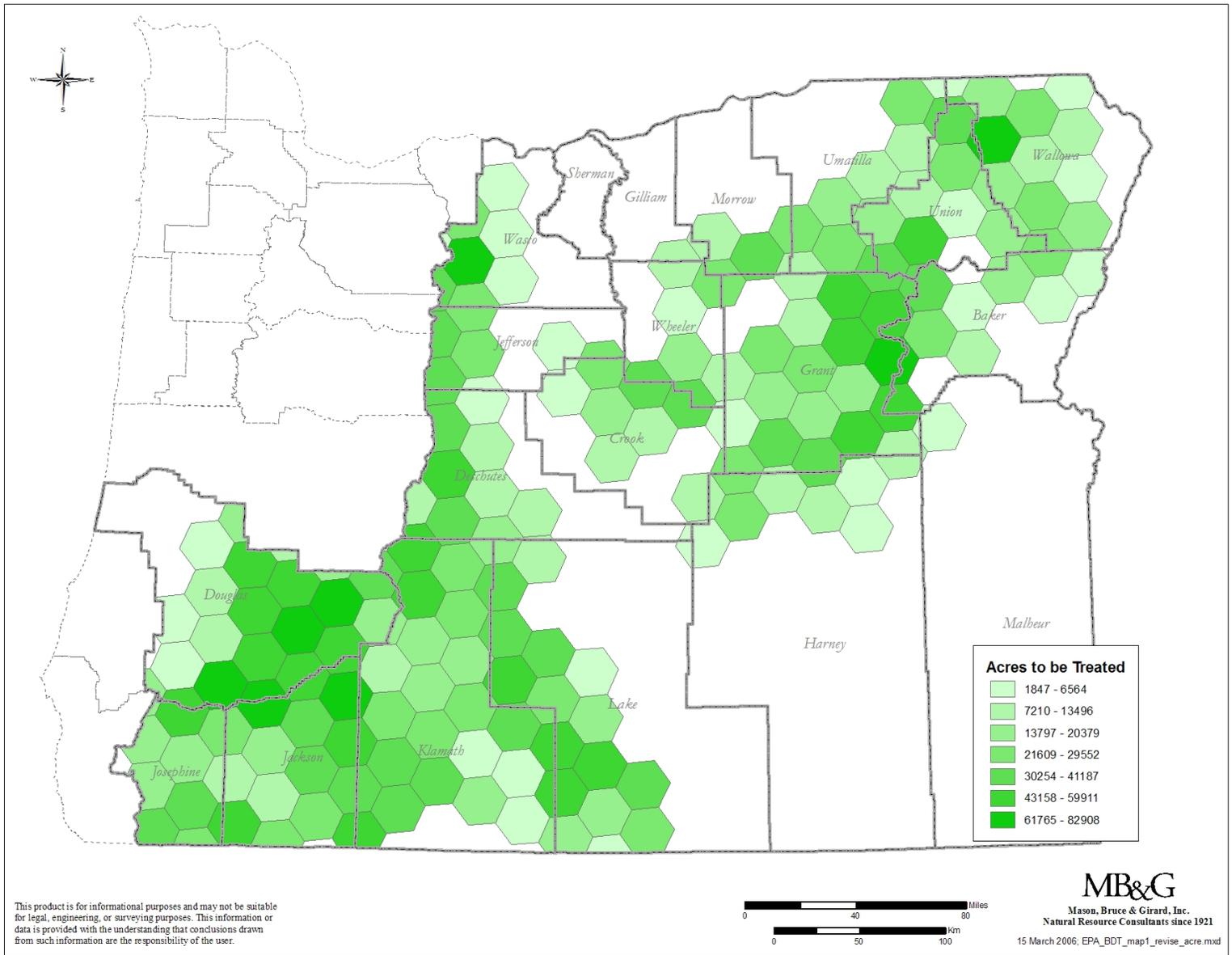


Figure 2-2 – Acres eligible for fuel reduction thinning treatment by 160,000 acre EMAP hexagon.



Electricity is Best Bet – Near Term

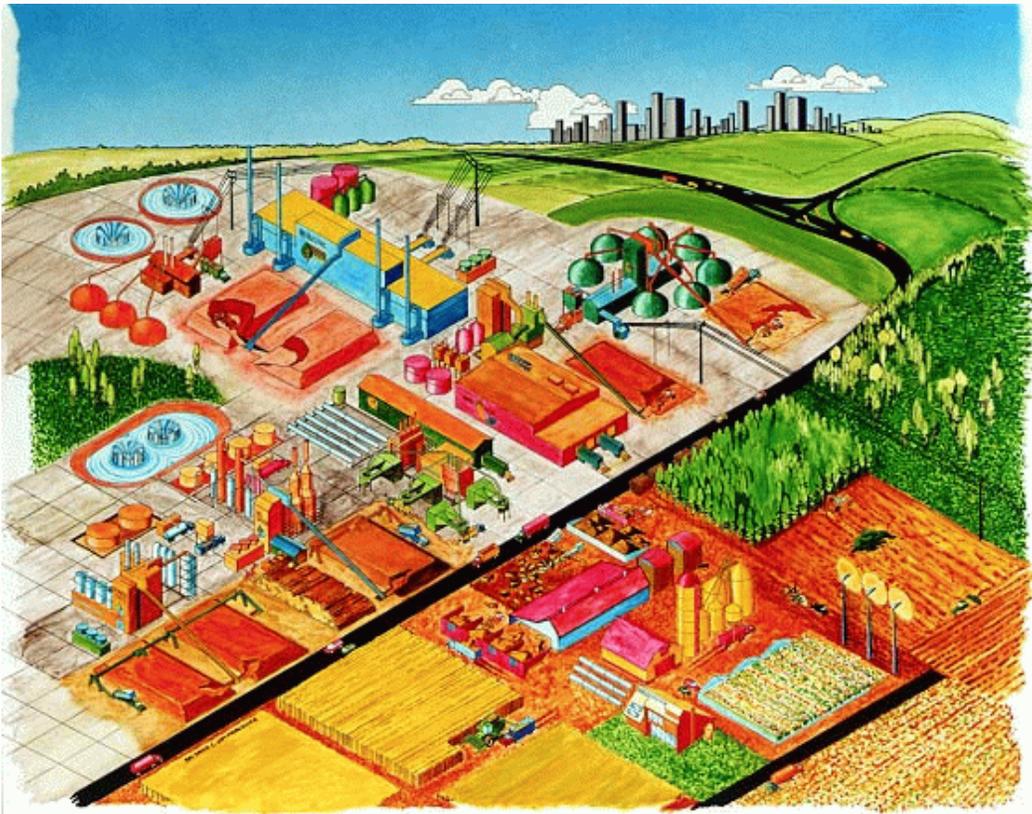
- 600,000 BDT/yr :: 81 MW @ \$45/BDT or 6.5¢/kWh
- Integrated stand management
- Combined Heat and Power (CHP)
- Areas where **Fuel Supply** (biomass) / **Transportation Access** / **Power Grid** overlap



Cellulose-to-Ethanol – Mid-term Goal

- ❖ Production not yet Cost Effective
- ❖ Cellulase Enzyme Production
- ❖ Cellulosic ethanol - 85% efficient
- ❖ Corn ethanol - 20% efficient
- ❖ Crop residue such as grass straw can be used
- ❖ Most Research Based on Hardwoods
- ❖ Delignification of Conifers is expensive
- ❖ Market and Supply Experience Limited

A Vision of the BioEconomy in the Year 2020



Biorefinery:
Cluster of
biobased
industries
producing
chemicals, fuels,
power, products,
and materials.

Integrated Bio-Economy Has Many Facets



Raw Material

Options

- Trees
- Grasses
- Agricultural Crops
- Agricultural Residues
- Animal Wastes
- Municipal Solid Waste



Technologies

- Acid/enzymatic hydrolysis
- Fermentation
- Bioconversion
- Chemical Conversion
- Composite products technologies
- Gasification
- Combustion
- Co-firing



End-Uses

Products

- Plastics
- Functional Monomers
- Solvents
- Chemical

Intermediates

- Phenolics
- Adhesives
- Hydraulic Fluids
- Fatty acids
- Carbon black
- Paints
- Dyes, Pigments, and Ink
- Detergents
- Paper
- Horticultural products
- Fiber boards
- Solvents
- Plastic filler
- Abrasives
- Building products

Fuel

Power



Environmental Benefits

❖ Include:

- air quality improvement,
 - reduction in greenhouse gases,
 - soil and water conservation, and
 - Protection and restoration of wildlife habitat and biodiversity
- ❖ Environmental benefits of biomass energy are estimated at 11.4¢/kWh
- ❖ The value of avoided forest overgrowth is estimated as 20.2¢/kWh
- ❖ The estimated net benefit of fuel reduction treatments is \$606 - \$1,402+ per acre
- ❖ These results suggest that the environmental benefits of forest biomass use for energy are well in excess of the market value of the electricity produced



Forest Biomass Work Group

- Diverse 30+ member work group
- Has met 10 times since October 2005
- Report produced January 2007
- Key findings accepted by:
 - Governor's Renewable Energy Work Group
 - Oregon Board of Forestry



Senate Bill 1072(2005)

A force behind Biomass Utilization in Oregon

- **Identified methods and tools available to remedy the problems facing Oregon's forests**
 - Participation by citizens, non governmental organizations (NGO's), and state agencies in development of federal forestland policies and management
 - Collaboration of citizens, NGO's, and state agencies to seek opportunities to utilize forest biomass for energy and other forest products. Consider benefits and consequences of biomass utilization. Look for market solutions, report back to the Governor / Legislature every 3 years.
 - Active Management
 - > **Community Wildfire Protection Plans (CWPP) identification of areas for fuel removal.**
 - > **Federal Stewardship Authorities, consider state role**



Key State Actions sought in Forest Biomass Work Group Report

1. Fund a biomass coordinator to increase understanding of benefits and consequences of biomass utilization.
2. Build on harvesting and research projects that have already been completed and fund new studies to fill in the information gaps.
3. Support action that will help coordinate R&D advances in forest biomass utilization with commercial technology development.
4. Continue administrative collaboration (under Enrolled Senate Bill 1072 - 2005 session).
5. Consider developing/ expanding Oregon incentives to off-set capital cost of biomass energy facilities.



SB 838 RPS

- **25% of Oregon's electric load will come from renewable energy by 2025**
- **Covers 3 largest utilities (75% of load)**
 - Indexed for smaller utilities
- **Will likely cover most of the new load**
- **Public purpose charge extended to 2025**



HB 2210 – Elements of Biofuels Package

- 1. Establishes new tax credit for producers and collectors of biofuel raw materials for energy generation (based on BTU - \$10/green ton woody biomass – Jan 1. 2007 – Jan 2013)**
- 2. Creates an income tax credit for consumer use of biofuel**
- 3. Established a Renewable Fuel Standard for biodiesel and ethanol.**



HB 2210 Application of Biomass Tax Credit

- 1. Eligible to any producer/harvester of biomass delivered to an Oregon biofuel/bioenergy processing facility**
 - No pre-application**
 - Grower retains weight tickets**
 - Use tickets to compute tax credit**
- 2. Special “pass-through” provision to transfer credit to third party**



HB 3201 (2211) Elements of BETC

- 1. Amends BETC to increase credit for renewable energy systems installed by business from 35% to 50% (combined heat and power projects eligible).**
- 2. Increases project cost limit from \$10 million to \$20 million**
- 3. Transferability, credit for high performance homes**
- 4. Applies to project constructed on or after Jan1. 2007.**



HB 3201 Applications of BETC

- 1. Eligible Costs are capital costs necessary to plant grow, harvest, store, crush or concentrate and transport crops to extent they are used to produce biofuel crops (no maintenance costs).**
 - > Chunk boxes, chippers, vans to transport to energy facility.
 - > May claim initial capital investment for equipment only once as a tax credit/eligible costs.
 - > New or existing equipment (appraised remaining value) is eligible for credit at pro-rated use rate.
 - > Must first apply to ODOE for project approval



Key Federal Actions sought in Forest Biomass Work Group Report

1. Congress should fully fund USFS and BLM Biomass Strategic Plans
2. Fund research focusing on conversion of biomass to cellulosic ethanol
3. Fund a cellulosic ethanol commercial demonstration facility in Oregon
4. Expedite Forest Stewardship contracting on Federal lands
5. Fund the existing federal transportation credit for biomass that was authorized by congress
6. Increase federal production tax credit for biomass to other renewables and extend length of time for renewal of FPTC.



What Else is Needed to move forward??

- **Federal Production tax credit authorized but not funded.**
- **Funding for BLM & USFS for increasing stewardship contracting on federal land and to provide for some monitoring on impacts.**
- **Research for cellulosic ethanol biofuels research.**
- **Other?**



Current Woody Biomass Projects

Thermal and Power Plants

- ❑ Douglas County Forest Products
- ❑ Tillamook Lumber - Hampton
- ❑ Rough and Ready
- ❑ Warm Springs
- ❑ Lakeview Biomass
- ❑ Stansport
- ❑ Feres Lumber
- ❑ Four more pending



Current Woody Biomass Projects

Power Plants

- ❑ Biomass One Expansion
- ❑ Sylvan Power

Prepared Fuels

- ❑ Bear Mountain Expansion 100k Tons
- ❑ Blue Mtn. Lumber Expansion 100k Tons
- ❑ Klamath Fuel 30k Tons
- ❑ West Oregon Wood Products 30k Tons



Forest Biomass Work Group Current Focus

- **Coordinate with Federal Forestland Advisory Committee for key federal changes needed.**
- **Facilitate understanding of new policy pieces put in place at state level in 2007.**
- **Actions to be aimed at a field focus across the state, addressing forest health concerns through expanding biomass utilization efforts.**



Conclusion



Woody Biomass for Energy can help:

- ❖ solve forest health & habitat problems
- ❖ create economic prosperity in rural Oregon
- ❖ produce renewable energy

Collaboration between stakeholder groups on forest management and industrial development issues will be necessary to develop a biomass industry in Oregon

Key federal changes to further biomass utilization is needed (congressional action).